invention. But the Examiner takes the position that the alloy composition anticipates the claimed composition and the casting step overlaps, and consequently, the long period stacking ordered structure phase would have been inherently possessed by the teachings of the Kawamura et al. reference. The Examiner therefore asserts that the burden is on Applicants to prove that the product of the prior art does not necessarily or inherently possess the characteristics (long period stacking ordered structured phase) attributed to the claimed product.

In response to the Examiner's argument in this regard, Applicants take the position that the long period stacking ordered structure (LPSO) phase as recited in claim 1 would not have been inherently possessed by the teachings of Kawamura et al. This has been proven by experiments showing that the Mg alloy melt-spun ribbon disclosed in Kawamura et al. does not have the long period stacking ordered structure phase. The experiment results are set forth in attached Fig. 1 and Fig. 2.

Fig. 1 shows X-ray diffraction patterns of cast Mg-Zn-Y alloy (GC alloy), injection-cast Mg-Zn-Y alloy (IC alloy) and melt spun Mg-Zn-Y alloys (MS10 ribbon, MS20 ribbon and MS40 ribbon).

Fig. 2(a) shows a TEM (Transmission Electron Microscope) image of cast Mg-Zn-Y alloy. Fig. 2(b) show a TEM image of injection-cast Mg-Zn-Y alloy. Fig. 2(c) shows a TEM image of MS40 ribbon.

The melt-spun Mg-Zn-Y alloys are for rapidly solidified powder metallurgy processing as mentioned in Kawamura et al. The cast Mg-Zn-Y alloy and the injection-cast Mg-Zn-Y alloy are casting products recited the claim 1 of the present application.

The manufacture methods of melt-spun Mg-Zn-Y alloys (MS10 ribbon, MS20 ribbon and MS40 ribbon) are as follows.

Mg97.25%Zn0.75%Y2% alloys were prepared by induction melting in an argon atmosphere. The compositions are nominally expressed in atomic percentage. The rapidly solidified Mg97.25%Zn0.75%Y2% ribbons were prepared by a single roller melt-spinning method in an argon atmosphere. Cooling rate of MS10 ribbon is 18,000 kelvin/second. Cooling rate of MS20 ribbon is 35,000 kelvin/second. Cooling rate of MS40 ribbon is 140,000 kelvin/second.

The manufacturing methods of cast Mg-Zn-Y alloy (GC alloy) and injection-cast Mg-Zn-Y alloy (IC alloy) are as follows.

Mg97.25%Zn0.75%Y2% alloys were prepared by induction melting in an argon atmosphere. The compositions are nominally expressed in atomic percentage. The cast Mg97.25%Zn0.75%Y2% alloy (GC alloy) was prepared by a gravity casting method in an argon atmosphere. The injection-cast Mg97.25%Zn0.75%Y2% alloy (IC alloy) was prepared by an injection casting method to the copper mold in an argon atmosphere. Cooling rate of GC alloy is 10 kelvin/second. Cooling rate of IC alloy is 550 kelvin/second.

The structure of each of GC alloy, IC alloy, MS10 ribbon, MS20 ribbon and MS40 ribbon was observed using XRD. Thus, Fig. 1 show X-ray diffraction patterns of GC alloy, IC alloy, MS10 ribbon, MS20 ribbon and MS40 ribbon.

It is confirmed by Fig. 1 that a LPSO phase is formed during solidification because the cooling rates are low in GC alloy and IC alloy; but because the cooling rates are fast in MS20 ribbon and MS40 ribbon, an LPSO phase is **not** formed during solidification.

The structure of each of GC alloy, IC alloy and MS40 ribbon was observed using TEM. Thus, Fig. 2 shows TEM image of (a) GC alloy, (b) IC alloy and (c) MS40 ribbon.

It is confirmed by Fig. 2 that the MS40 ribbon consists of alpha-Mg solid solution, and that a LPSO phase is **not** formed in MS40 ribbon, whereas a LPSO phase is formed in GC alloy and IC alloy.

Therefore, even if Mg alloys have the same composition, the experimental results prove that the presence or absence of LPSO depends on whether the Mg alloy is formed by the single roller melt-spinning method (Kawamura et al.) or by the casting method (present invention). That is, one of ordinary skill in the art would recognize that the presence or absence of LPSO depends on whether the Mg-Zn- (Dy, Ho, Er) alloy is formed by the single roller melt-spinning method or by the casting method.

Accordingly, referring again to the Examiner's position as set forth in the Response to Arguments section of the Office Action, Applicants take the position that they have satisfied the burden of proving that the Kawamura et al. product does not necessarily or inherently possess the long period stacking ordered structure phase which is a characteristic of the presently claimed product. For this reason, all of the prior art rejections set forth by the Examiner should be withdrawn.

Therefore, in view of the foregoing remarks, it is submitted that the application is now in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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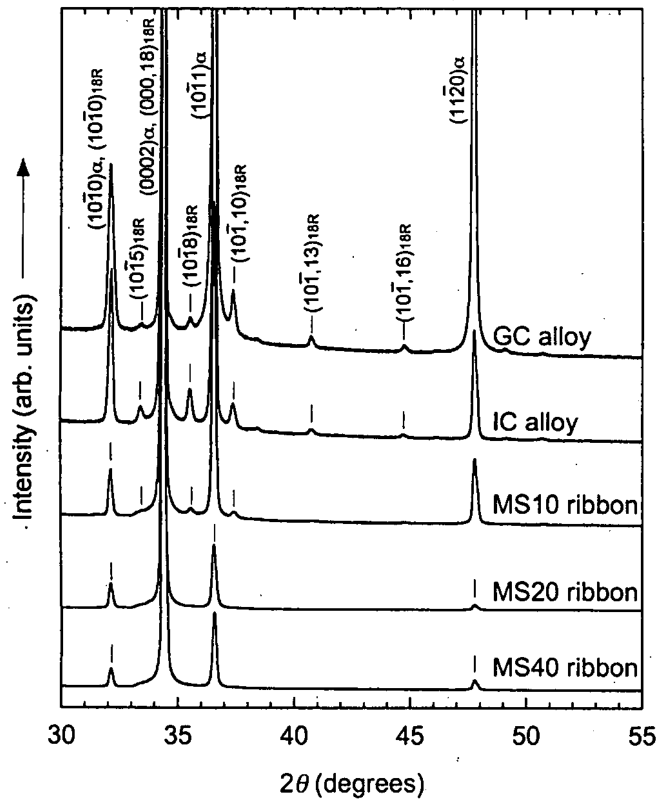

Fig. 1. X-ray diffraction patterns of cast, injection-cast, and melt spun Mg-Zn-Y alloys.
The MS20 and MS40 ribbons were prepared by melt spinning method with cooling rate of 3.5 x 10^4 K s^{-1} and 1.4 x 10^5 K s^{-1}, respectively. Although the cast alloy and injection-cast alloy consist of alpha-Mg matrix and LPSO phases, the MS 20 and MS40 ribbons consist of alpha-Mg matrix phase.

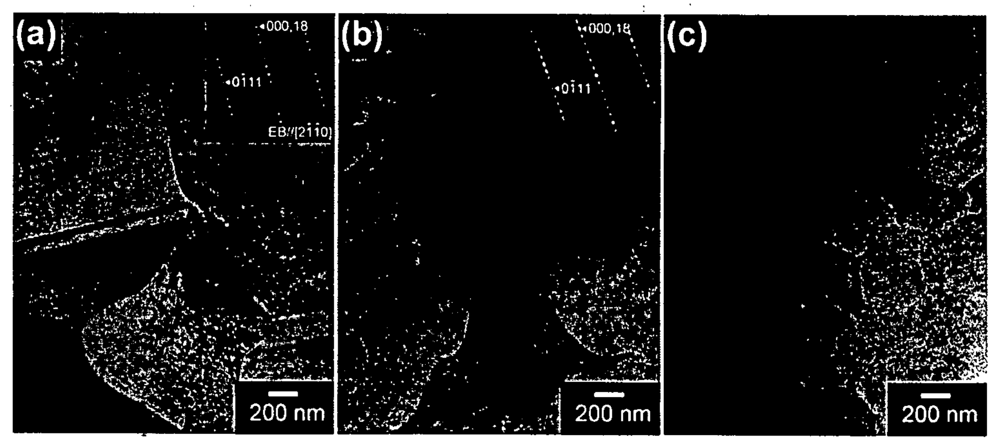

Fig. 2. TEM images of (a) cast, (b) injection-cast, and (c) melt spun Mg-Zn-Y alloys. Melt spun ribbon consists of alpha-Mg solid solution. No LPSO phase exists in rapidly solidified specimen.